

FORM PTO-1390  
(REV 5-93)

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

ATTORNEY'S DOCKET NUMBER

**TRANSMITTAL LETTER TO THE UNITED STATES  
DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING  
A FILING UNDER 35 U.S.C. 371**

225/48715

U.S. APPLICATION NO. (if known, see 37 CFR 1.5)

09/806465

INTERNATIONAL APPLICATION NO.  
PCT/EP99/07267INTERNATIONAL  
FILING DATE  
OCTOBER 1, 1999PRIORITY DATE  
CLAIMED  
OCTOBER 2, 1998

## TITLE OF INVENTION

METHOD FOR DESULFURIZING ENGINE FUEL ON BOARD A MOTOR VEHICLE

## APPLICANT(S) FOR DO/EO/US

Eberhard HOLDER, Roland KEMMER, Martin MATT, Viktor PFEFFER, Carsten PLOG, Thomas STENGEL, Ralph STETTER and Karl-Heinz THIEMANN

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371
3. ☒ This express request to begin national examination procedures (35 U.S.C. 371(f) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2)).
  - a. ☐ is transmitted herewith (required only if not transmitted by the International Bureau).
  - b. ☒ has been transmitted by the International Bureau
  - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US)
6. ☒ A translation of the International Application into English (35 U.S.C. 371(c)(2)).
7. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
  - a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
  - b. ☐ have been transmitted by the International Bureau.
  - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
  - d. ☐ have not been made and will not be made.
8. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)). UNEXECUTED
10. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

## Item 11. to 16. below concern other document(s) or information included:

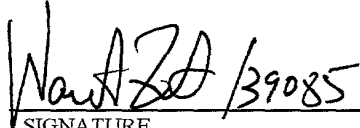
11. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☒ A **FIRST** preliminary amendment.  
☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
14. ☐ A substitute specification.
15. ☐ A change of power of attorney and/or address letter.
16. ☒ Other items or information:

PCT/IB/308



23911

PATENT TRADEMARK OFFICE

U.S. APPLICATION NO. (file with fee 37 CFR 1.5) <b>09/806465</b>		INTERNATIONAL APPLICATION NO. PCT/EP99/07267		ATTORNEY'S DOCKET NUMBER 225/49816																							
17. <input checked="" type="checkbox"/> The following fees are submitted: Basic National Fee (37 CFR 1.492(a)(1)-(5)):  Search Report has been prepared by the EPO or JPO ..... \$860.00 International preliminary examination fee paid to USPTO (37 CFR 1.482) .... \$690.00 No international preliminary examination fee paid to USPTO (37 CFR 1.482)  but international search fee paid to USPTO (37 CFR 1.445(a)(2)) ..... \$710.00 Neither international preliminary examination fee (37 CFR 1.482) nor  international search fee (37 CFR 1.445(a)(2)) paid to USPTO ..... \$ 1000.00 International preliminary examination fee paid to USPTO (37 CFR 1.482)  and all claims satisfied provisions of PCT Article 33(2)-(4) ..... \$100.00  <b>ENTER APPROPRIATE BASIC FEE AMOUNT =</b> \$ 860.00				CALCULATIONS		PTO USE ONLY																					
Surcharge of \$130.00 for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input checked="" type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(e)).				\$ 130.00																							
<table border="1"> <thead> <tr> <th>Claims</th> <th>Number Filed</th> <th>Number Extra</th> <th>Rate</th> </tr> </thead> <tbody> <tr> <td>Total Claims</td> <td>- 20 =</td> <td></td> <td>X \$18.00</td> </tr> <tr> <td>Independent Claims</td> <td>- 3 =</td> <td></td> <td>X \$80.00</td> </tr> <tr> <td>Multiple dependent claims(s) (if applicable)</td> <td></td> <td></td> <td>+ \$270.00</td> </tr> <tr> <td colspan="3"><b>TOTAL OF ABOVE CALCULATIONS =</b></td> <td>\$ 990.00</td> </tr> </tbody> </table>				Claims	Number Filed	Number Extra	Rate	Total Claims	- 20 =		X \$18.00	Independent Claims	- 3 =		X \$80.00	Multiple dependent claims(s) (if applicable)			+ \$270.00	<b>TOTAL OF ABOVE CALCULATIONS =</b>			\$ 990.00				
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Applicant claims Small Entity Status (See 37 CFR §1.27) <input type="checkbox"/> yes <input type="checkbox"/> no.				\$																							
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<b>TOTAL NATIONAL FEE =</b>				\$ 990.00																							
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28,3.31). \$40.00 per property +				\$																							
<b>TOTAL FEE ENCLOSED =</b>				\$ 990.00																							
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a. <input checked="" type="checkbox"/> One check in the amount of \$ 990.00 for the filing fee is enclosed b. <input type="checkbox"/> Please charge my Deposit Account No. _____ in the amount of \$ _____ to cover the above fees. A duplicate copy of this sheet is enclosed. c. <input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge any additional fees, which may be required, or credit any overpayment to Deposit Account No. <u>05-1323</u> . A duplicate copy of this sheet is enclosed. NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.																											
SEND ALL CORRESPONDENCE TO: Evenson, McKeown, Edwards & Lenahan, P.L.L.C. 1200 G Street, N.W., Suite 700 Washington, D.C. 20005 Tel. No. (202) 628-8800 Fax No. (202) 628-8844				SIGNATURE  NAME Donald D. Evenson 26,160 REGISTRATION NUMBER April 2, 2001 DATE																							

09/806465

532 Rec'd PCT/TO 02 APR 2001

Attorney Docket: 225/49816  
PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: EBERHARD HOLDER ET AL.

Serial No.: NOT YET ASSIGNED Group Art Unit:

PCT APPLICATION NO. PCT/EP99/07267

Filed: April 2, 2001 Examiner:

Title: METHOD FOR DESULPHURIZING ENGINE FUEL ON BOARD  
A MOTOR VEHICLE

PRELIMINARY AMENDMENT

Box PCT

Commissioner for Patents  
Washington, D.C. 20231

Sir:

Please enter the following amendments to the specification and claims, as amended by way of Annexes to the International Preliminary Examination Report for PCT/EP99/07267, prior to the examination of the application during the U.S. National Phase.

IN THE SPECIFICATION:

Page 1, lines 6-9:

BACKGROUND AND SUMMARY OF INVENTION

The invention relates to a process for the desulfurization of an engine fuel onboard a motor vehicle.

Page 1, lines 28-30:

This object is achieved by the process according to the present invention. Advantageous embodiments of the invention form the subject matter of further claims.

Page 4, lines 1-16:

The invention is explained in more detail with reference to drawings.

#### BRIEF DESCRIPTION OF THE DRAWINGS

- Fig. 1 shows a first structure for carrying out the process according to the invention;
- Fig. 2 shows a second structure for carrying out the process according to the invention;
- Fig. 3 shows an adsorption device for carrying out the process according to the invention;
- Fig. 4 shows a test structure for determining the adsorber properties and adsorber capacity;
- Fig. 5 shows the effect of the fuel sulfur content on the NO<sub>x</sub> conversion of an exhaust-gas after-treatment system.

#### DETAILED DESCRIPTION OF THE DRAWINGS

The adsorption device may be connected in series downstream of the fuel pump (Fig. 1) or as a bypass to the normal fuel supply (Fig. 2).

Page 7, line 4:

WHAT IS CLAIMED IS:

IN THE CLAIMS:

Please cancel all of the claims presently in the application and substitute new Claims 13-29 as follows:

13. (New) A process for the desulfurization of an engine fuel onboard a motor vehicle, comprising:

contacting an engine fuel comprising sulfur-containing components with a selective liquid-phase adsorption material comprising an oxide of Al, Mg, Si, or Ti that is doped with Ag; and

separating the sulfur-containing components from the engine fuel, thereby obtaining a low-sulfur fuel.

14. (New) A process according to Claim 13, wherein the adsorption material has an internal surface area of from 10 to 1600 m<sup>2</sup>/g.

15. (New) A process according to Claim 13, wherein the adsorption material comprises at least one of Al<sub>2</sub>O<sub>3</sub>, MgO, SiO<sub>2</sub>, or TiO<sub>2</sub>.

16. (New) A process according to Claim 13, wherein the adsorption material comprises zeolites, hydrotalcites, or mixed oxides doped with Ag.

17. (New) A process according to Claim 13, wherein the adsorption material is a biogenic material.

18. (New) A process according to Claim 13, wherein the biogenic material comprises an enzyme or a microorganism.

19. (New) A process according to Claim 13, wherein the engine fuel is selected from the group consisting of petrol, diesel fuel, kerosine, and methanol.

20. (New) A process according to Claim 13, further comprising collecting the low-sulphur fuel in a tank.

21. (New) A process according to Claim 13, further comprising immediately using the low-sulfur fuel.

22. (New) A process according to Claim 13, wherein the adsorption material is arranged in series with a fuel pump.

23. (New) A process according to Claim 13, wherein the adsorption material is arranged in a bypass circuit of a fuel pump.

24. (New) A process according to Claim 13, wherein the adsorption material is integrated in a single structural unit with a fuel filter.

25. (New) A process according to Claim 13, further comprising regenerating a sulfur-containing adsorption material onboard the motor vehicle.

26. (New) A process according to Claim 13, further comprising replacing a sulfur-containing adsorption material.

27. (New) A process according to Claim 25, wherein the regenerating comprises heating the sulfur-containing adsorption material with the engine oil or the engine coolant of the motor vehicle.

28. (New) A process for removing nitrogen oxides from a lean exhaust gas, comprising:

contacting the low-sulfur fuel according to Claim 13 with a catalytic converter; and

removing nitrogen oxides from the lean exhaust gas by using the low-sulfur fuel as a reducing agent.

29. (New) A process for desulfurizing a catalytic converter in an exhaust-gas after-treatment engine system, comprising regenerating the catalytic converter with low-sulfur fuel obtained according to Claim 13, thereby desorbing accumulated sulfur from the catalytic converter.

**IN THE ABSTRACT:**

Please delete the Abstract and substitute the attached Abstract.

**REMARKS**

Claims 13-29 are pending herein. Entry of the amendments to the specification and claims, as amended by way of Annexes to the International Preliminary Examination Report for PCT/EP99/07267, before examination of the application in the U.S. National Phase is respectfully requested.

If there are any questions regarding this Preliminary Amendment or this application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application for all concerned.

April 2, 2001

Donald D. Evenson  
Registration No. 26,160

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## ATTACHMENT SHOWING MARKED UP CHANGES TO SPECIFICATION

Page 1, lines 6-9:

### BACKGROUND AND SUMMARY OF INVENTION

The invention relates to a process for the desulfurization of an engine fuel onboard a motor vehicle.

Page 1, lines 28-30:

This object is achieved by the process according to [Claim 1] the present invention. Advantageous embodiments of the invention form the subject matter of further claims.

Page 4, lines 1-16:

The invention is explained in more detail with reference to drawings[, in which:].

### BRIEF DESCRIPTION OF THE DRAWINGS

- Fig. 1 shows a first structure for carrying out the process according to the invention;
- Fig. 2 shows a second structure for carrying out the process according to the invention;
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- Fig. 4 shows a test structure for determining the adsorber properties and adsorber capacity;
- Fig. 5 shows the effect of the fuel sulfur content on the NO<sub>x</sub> conversion of an exhaust-gas after-treatment system.

DETAILED DESCRIPTION OF THE DRAWINGS

The adsorption device may be connected in series downstream of the fuel pump (Fig. 1) or as a bypass to the normal fuel supply (Fig. 2).

Page 7, line 4:

[Patent claims] WHAT IS CLAIMED IS:

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29301/WO/1

DaimlerChrysler AG  
Stuttgart

5      **Process for the desulphurization of an engine fuel  
onboard a motor vehicle**

The invention relates to a process for the desulphurization of an engine fuel onboard a motor vehicle.

10            The desulphurization of engine fuel is usually carried out using large-scale chemical processes in refineries during production of the fuel. Processes which are known for this purpose include extraction, adsorption (e.g. US 5,360,536), distillation or microbiological  
15      processes. Commercially available engine fuels in Europe currently have a residual sulphur content of approximately 200 ppm. This causes problems with regard to the sulphur compatibility of modern exhaust-gas after-treatment systems, which include adsorbers and catalytic  
20      converters. Therefore, residual sulphur contents of less than 10 ppm are desired.

It is an object of the invention to provide a process for separating off sulphur-containing components from an engine fuel which is suitable for use in mobile  
25      systems. In particular, only a small overall volume and a low weight should be required in order to implement this process.

This object is achieved by the process according to Claim 1. Advantageous embodiments of the invention  
30      form the subject matter of further claims.

According to the invention, the desulphurization of the fuel takes place onboard the motor vehicle by selectively separating off the sulphur-containing fuel components by means of liquid-phase adsorption. To do  
35      this, an adsorption material which selectively adsorbs

substantially only the sulphur-containing fuel components is used.

The adsorption means used is in particular solids with a high surface area (in particular in the range from 10 to 1 600 m<sup>2</sup>/g), primarily substances of this type which contain Al, Mg, Si or Ti in oxide form. Examples of these substances are Al<sub>2</sub>O<sub>3</sub>, MgO, SiO<sub>2</sub>, TiO<sub>2</sub>, zeolites, hydrotalcites or mixed oxides. It is also possible to use the said substances doped with a metal, such as for example an alkali metal, an alkaline-earth metal, a rare earth, or Ag, Cu, Co, Fe, Mn, Ni, V or Zn. Biogenic materials, such as for example enzymes, can also be used. Furthermore, it is possible to convert the sulphur contained in the fuel into other sulphur compounds by means of microorganisms which are brought into contact with the fuel.

The adsorption material has a temporaly limited separating capacity and has to be replaced after a period of time as part of the regular servicing of the vehicle. In an alternative embodiment, however, the adsorption material can also be regenerated onboard the motor vehicle, in particular by heat treatment. The regeneration can advantageously be carried out by temperature control by means of the coolant circuit (approx. 80°C) or engine oil circuit (> 100°C) which is present in the vehicle.

In an advantageous embodiment, adsorption device and fuel filter can be integrated in a single structural unit. In this case, adsorption material and the material for the fuel filtering may, for example, be arranged or layered immediately next to or on top of one another.

By using the low-sulphur fuel obtained, it is possible to significantly prolong the service life of modern exhaust-gas after-treatment systems.

The low-sulphur fuel is particularly suitable for being added when a spark-ignition engine is operating in lean-burn mode.

5 In the case of a diesel engine, the particle emissions in the exhaust gas can be reduced by the addition of low-sulphur diesel fuel.

In addition to being used as an engine fuel, the low-sulphur fuel can also be used as a reducing agent for deNOx catalytic converters in lean exhaust gas.

10 A further application for the low-sulphur fuel obtained using the process according to the invention is its use in the desulphurization of a catalytic converter in an exhaust-gas after-treatment system of an engine. In the exhaust-gas after-treatment system, from time to time  
15 sulphur accumulates on the surface of the catalytic converter and is removed by regeneration (desorption). This can only take place with low-sulphur exhaust gas.

The outlay on equipment for carrying out the process according to the invention is low. Consequently,  
20 it is also possible for the overall volume and weight to be kept low. The process according to the invention is therefore suitable for use in all mobile systems, such as passenger or commercial vehicles or in rail-borne vehicles.

25 A further advantage of the process according to the invention is that the low-sulphur fuel fraction is available onboard as soon as the engine is started. It is therefore possible to dispense with an additional storage tank for low-sulphur fuel specifically for the cold-start  
30 phase.

The low-sulphur fuel obtained can either be utilized immediately or can be stored in a tank.

The process according to the invention can be used for all engine fuels, in particular petrol or diesel  
35 fuels, kerosine or methanol.

The invention is explained in more detail with reference to drawings, in which:

- Fig. 1 shows a first structure for carrying out the process according to the invention;
- 5 Fig. 2 shows a second structure for carrying out the process according to the invention;
- Fig. 3 shows an adsorption device for carrying out the process according to the invention;
- Fig. 4 shows a test structure for determining the adsorber properties and adsorber capacity;
- 10 Fig. 5 shows the effect of the fuel sulphur content on the  $\text{NO}_x$  conversion of an exhaust-gas after-treatment system.

The adsorption device may be connected in series downstream of the fuel pump (Fig. 1) or as a bypass to the normal fuel supply (Fig. 2).

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Fig. 1 shows an arrangement with the fuel pump and adsorption device arranged in series. The fuel is removed from the fuel tank KT by means of electrical fuel pump KP and then passes through the adsorption device AD according to the invention before being fed to the engine via the injection nozzle ED. The intake pipe of the engine is denoted by AR. In the series circuit illustrated here, all the fuel supplied to the engine is desulphurized.

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In the case of the bypass circuit, it is possible to switch between the normal branch, without the adsorption device, and the branch with the adsorption device, by means of a valve V. In this way, it is possible to employ the desulphurization only in certain operating phases of the engine. For example, the desulphurization can be included in a controlled manner only when the engine is in lean-burn mode and during desulphurization of the adsorber catalytic converter contained in the exhaust-gas after-treatment system. The bypass circuit illustrated allows the running capacity of

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the adsorption device to be increased or allows the adsorption device to be of smaller design.

Fig. 3 diagrammatically depicts an adsorption device in the form of a separating column, the interior of which is filled by the adsorption material. The sulphur-containing fuel mixture to be separated is introduced undiluted into the inlet of the separating column and is passed to the adsorption material. The sulphur-containing fuel components are selectively adsorbed on the adsorption material. The sulphur-free (generally low-boiling) fuel components which have not been adsorbed leave the separation column at the opposite end as the eluate. The separation column is surrounded by an annular channel through which a heat-transfer medium flows in order to control the temperature of the separation column.

Fig. 4 shows the test structure for determining the adsorber properties and the adsorber capacity. The fuel is removed from a storage vessel and is passed through the temperature-controlled adsorption column by means of a HPLC pump (max. throughput 10 ml/min). For quantitative analysis, the eluate can be analysed off-line by means of gas chromatography and X-ray fluorescence analysis.

Fig. 5 shows the effect of the sulphur content of the fuel on the  $\text{NO}_x$  conversion of an exhaust-gas after-treatment system. The operating duration (in hours) is plotted on the abscissa, and the  $\text{NO}_x$  conversion (in %) is plotted on the ordinate. Two series of measurements were recorded for sulphur contents of 31 ppm and 130 ppm, with the same type of catalytic converter. The tests were carried out using a direct-injection spark-ignition engine in mixed lean-burn mode (30 seconds of lean-burn mode with  $\lambda = 1.5$  and 2 seconds of rich-burn mode with  $\lambda = 0.75$ ). As can be seen from the comparison of the

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- 6 -

measurement series, the service life of the catalytic converter falls drastically with a high sulphur content.

2025 RELEASE UNDER E.O. 14176

DaimlerChrysler AG  
Stuttgart

**Patent claims:**

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1. Process for the desulphurization of an engine fuel onboard a motor vehicle by separating off the sulphur-containing components of the engine fuel by means of selective liquid-phase adsorption on an adsorption material.

10

2. Process according to Claim 1 or 2, characterized in that the adsorption material has an internal surface area of from 10 to 1 600 m<sup>2</sup>/g.

15

3. Process according to one of the preceding claims, characterized in that the adsorption material contains Al, Mg, Si or Ti in oxide form, such as for example Al<sub>2</sub>O<sub>3</sub>, MgO, SiO<sub>2</sub>, TiO<sub>2</sub>, zeolites, hydrotalcites, mixed oxides or the said substances doped with a metal, such as for example alkali metals, alkaline-earth metals, rare earths, Ag, Cu, Co, Fe, Mn, Ni, V, Zn.

20

4. Process according to one of Claims 1 or 2, characterized in that the adsorption material is a biogenic material, such as for example an enzyme, or contains microorganisms.

25

5. Process according to one of the preceding claims, characterized in that the fuel is a petrol or diesel fuel or kerosine or methanol.

6. Process according to one of the preceding claims, characterized in that the low-sulphur fuel obtained is used immediately or is collected in a tank.

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7. Process according to one of the preceding claims, characterized in that the low-sulphur fuel obtained is used as reducing agent for deNO<sub>x</sub> catalytic converters in lean exhaust gas.

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8. Process according to one of the preceding claims, characterized in that the adsorption material is arranged

in series with the fuel pump or as bypass circuit with respect to the fuel pump.

5 9. Process according to Claim 8, characterized in that the low-sulphur fuel obtained in the bypass circuit is used when the engine is in lean-burn mode or during desulphurization of the exhaust-gas after-treatment system of the engine.

10 10. Process according to one of the preceding claims, characterized in that the adsorption material is integrated in a single structural unit with the material for the fuel filtering.

11. Process according to one of the preceding claims, characterized in that the laden adsorption material is regenerated onboard the motor vehicle or is replaced.

15 12. Process according to Claim 11, characterized in that the engine oil or the engine coolant of the motor vehicle is used as heat source for the regeneration of the adsorption material.

29301/WO/1

DaimlerChrysler AG  
Stuttgart

### **Abstract**

The invention relates to a process for the desulphurization of an engine fuel onboard a motor vehicle by separating off the sulphur-containing components of the engine fuel by means of selective liquid-phase adsorption on an adsorption material.

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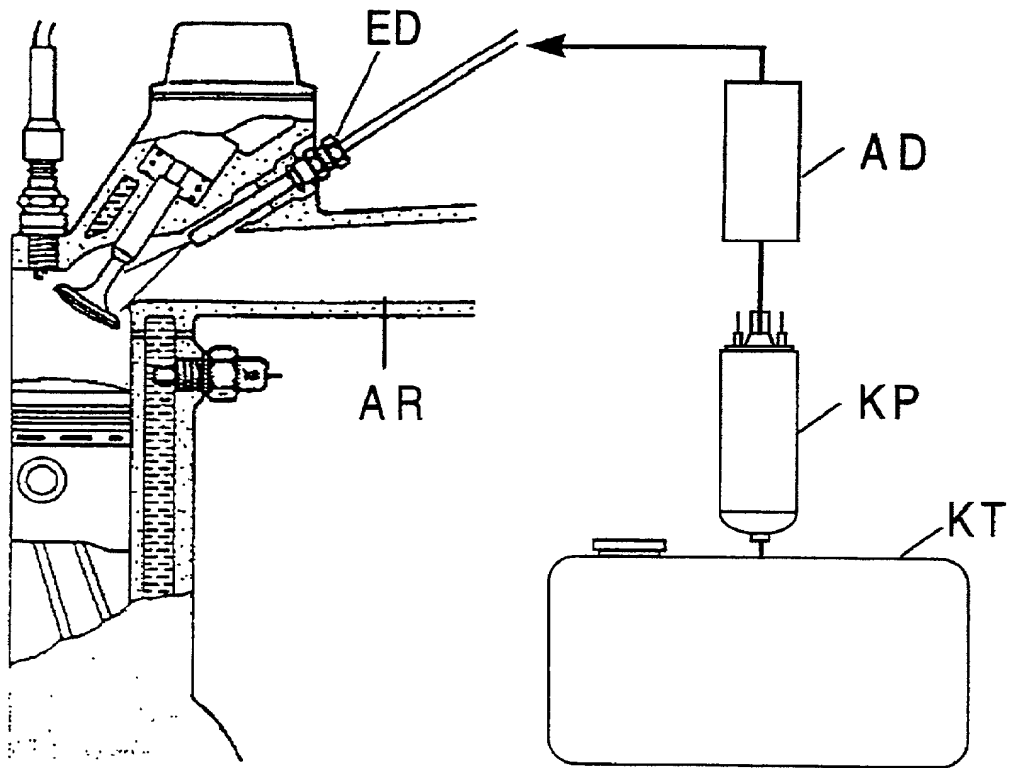


Fig. 1

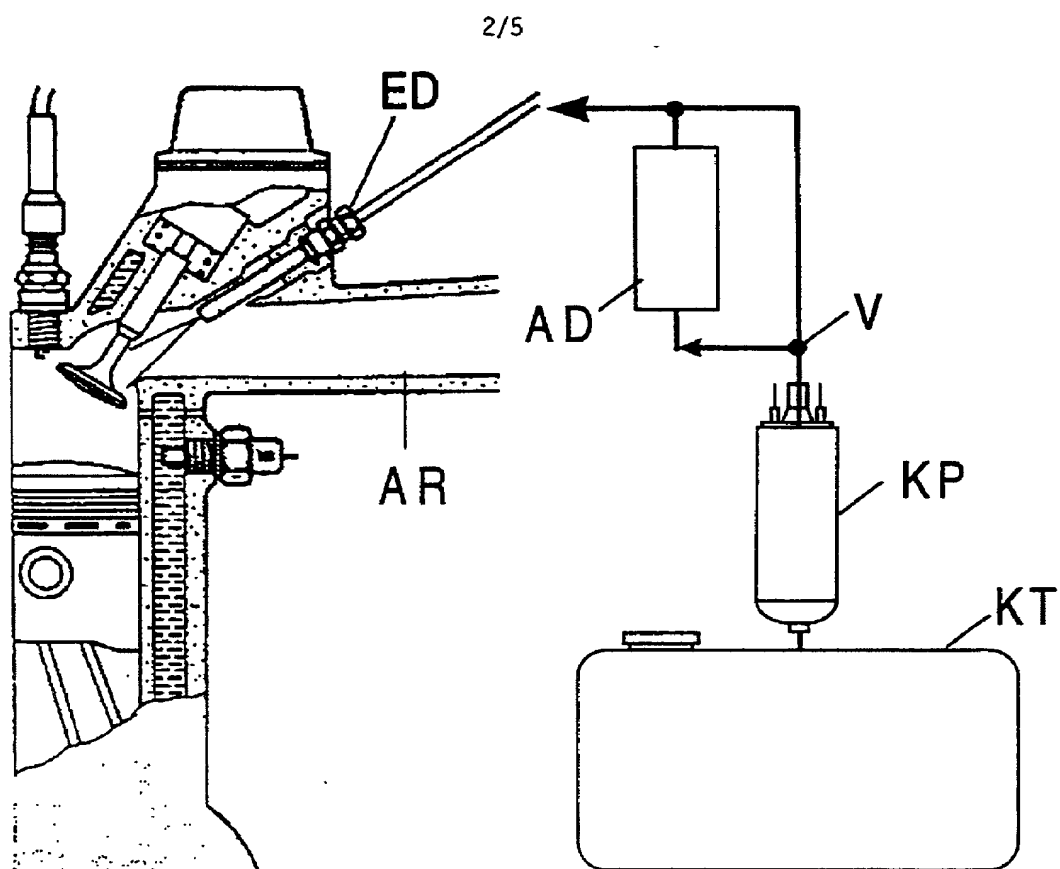


Fig. 2

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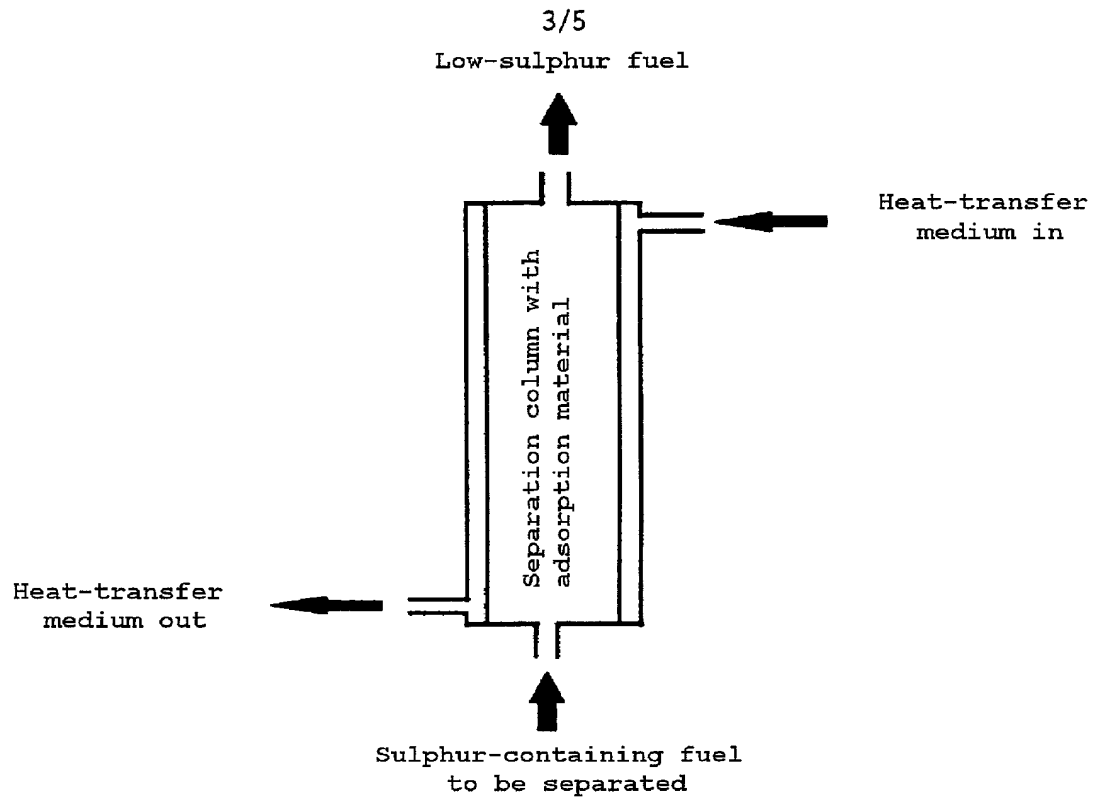


Fig. 3

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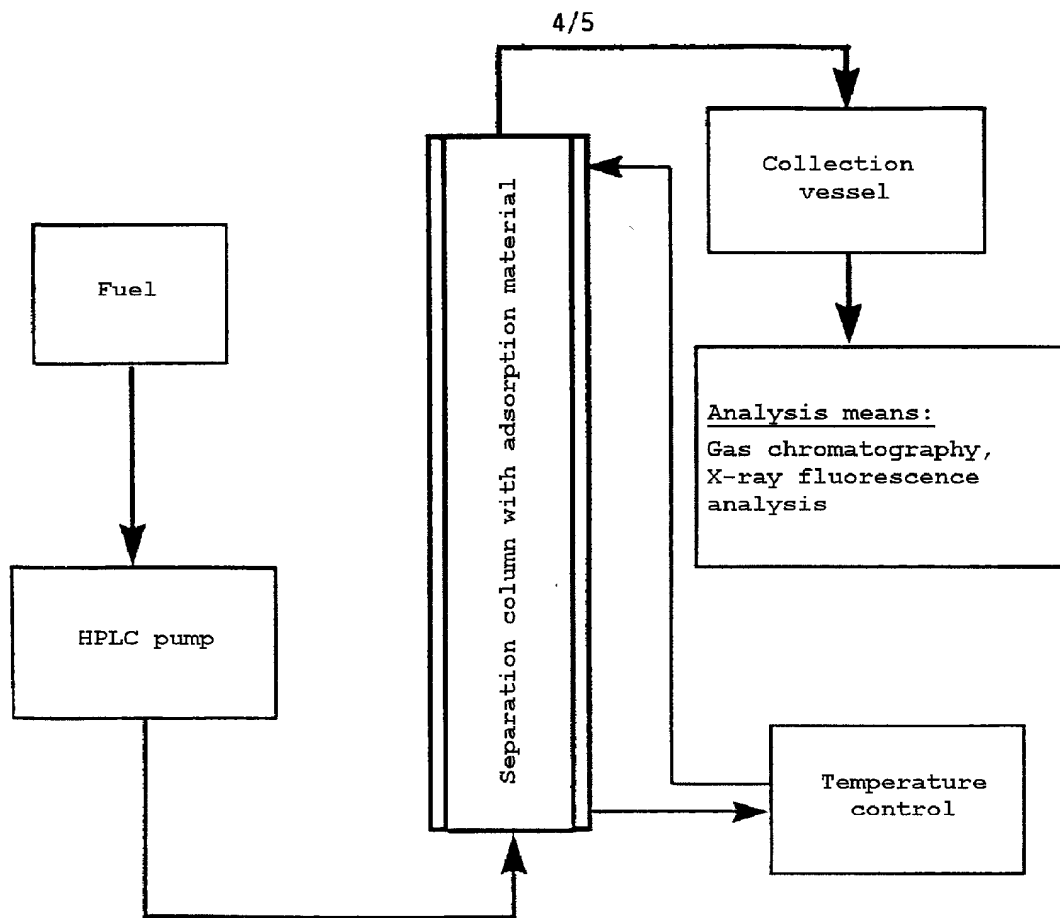


Fig. 4

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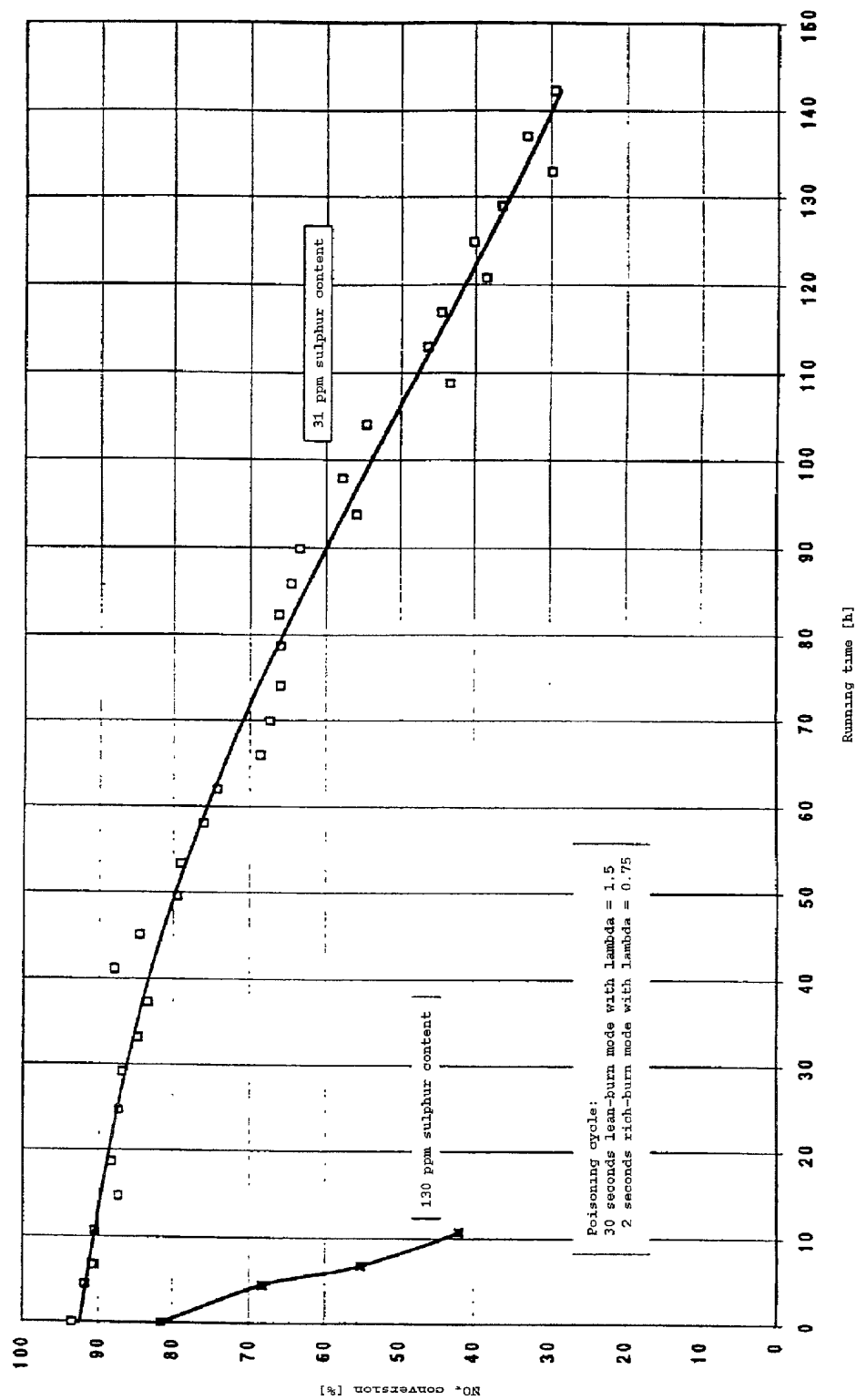


Fig. 5

**DECLARATION AND POWER OF ATTORNEY - PATENT APPLICATION**

As a below named inventor, I hereby declare that my citizenship, postal address and residence are as stated below; that I verily believe I am the original, first and sole inventor (if only one inventor is named below) or a joint inventor (if plural inventors are named below) of the invention entitled:

**PROCESS FOR THE DESULPHURIZATION OF AN ENGINE FUEL ONBOARD A MOTOR  
VEHICLE**

the specification of which

\_\_\_\_\_ is attached hereto, or  
X was filed on October 1, 1999 as Application Serial No. PCT/EP99/07267  
 and was amended on August 3, 2000 (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above. I acknowledge the duty to disclose all information known to be material to patentability as defined in 37 CFR §1.56. I hereby claim foreign priority benefits under Title 35, United States Code §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)	Priority Claimed		
<u>198 45 397.3</u>	<u>GERMANY</u>	<u>2 OCTOBER 1998</u>	<u>YES</u>
(Number)	(Country)	(Day/Month/Year)	

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose all information known to be material to patentability as defined in 37 CFR §1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application:

_____	_____	_____
(Application Serial No.)	(Filing Date)	(Status)

I hereby appoint as principal attorneys Herbert I. Cantor, Reg. No. 24,392; James F. McKeown, Reg. No. 25,406; Donald D. Evenson, Reg. No. 26,160; Joseph D. Evans, Reg. No. 26,269; Gary R. Edwards, Reg. No. 31,824; and Jeffrey D. Sanok, Reg. No. 32,169, to prosecute and transact all business in the Patent and Trademark Office connected with this application and any related United States and international applications. Please direct all communications to:

**Evenson, McKeown, Edwards & Lenahan, P.L.L.C.**

**1200 G Street, N.W., Suite 700**

**Washington, D.C. 20005**

**Telephone: (202) 628-8800**

**Facsimile: (202) 628-8844**

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under §1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

<b>INVENTOR:</b>	<b>Eberhard HOLDER</b>
Citizenship:	German
Post Office Address/	Albert-Schweitzer-Strasse 12
Residence:	D-72127 Kusterdingen, GERMANY

\_\_\_\_\_  
 (date)

\_\_\_\_\_  
 (signature of 1st inventor)

**DECLARATION AND POWER OF ATTORNEY**

Attorney Docket No. 225/49816

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**INVENTOR:** **Roland KEMMLER**  
Citizenship: German  
Post Office Address/ Kächeleweg 7  
Residence: D-70619 Stuttgart, GERMANY

\_\_\_\_\_  
(date)

\_\_\_\_\_  
(signature of 2nd inventor)

**INVENTOR:** **Martin MATT**  
Citizenship: German  
Post Office Address/ Im Zillhardt 14  
Residence: D-76646 Bruchsal, GERMANY

\_\_\_\_\_  
(date)

\_\_\_\_\_  
(signature of 3rd inventor)

**INVENTOR:** **Viktor PFEFFER**  
Citizenship: German  
Post Office Address/ Lenzhalde 62  
Residence: D-73760 Ostfildern, GERMANY

\_\_\_\_\_  
(date)

\_\_\_\_\_  
(signature of 4th inventor)

**INVENTOR:** **Carsten PLOG**  
Citizenship: German  
Post Office Address/ Döllenstrasse 13  
Residence: D-88677 Markdorf, GERMANY

\_\_\_\_\_  
(date)

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(signature of 5th inventor)

**INVENTOR:** **Thomas STENGEL**  
Citizenship: German  
Post Office Address/ Müllerstrasse 25  
Residence: D-88045 Friedrichshafen, GERMANY

\_\_\_\_\_  
(date)

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(signature of 6th inventor)

**INVENTOR:** **Ralph STETTER**  
Citizenship: German  
Post Office Address/ Am Hohenstein 4  
Residence: D-73630 Remshalden, GERMANY

\_\_\_\_\_  
(date)

\_\_\_\_\_  
(signature of 7th inventor)

**DECLARATION AND POWER OF ATTORNEY**

Attorney Docket No. 225/49816

Page 3

<b>INVENTOR:</b>	<b>Karl-Heinz THIEMANN</b>
Citizenship:	German
Post Office Address/	Eichendorffweg 1
Residence:	D-71404 Korb, GERMANY

\_\_\_\_\_  
(date)

\_\_\_\_\_  
(signature of 8th inventor)

DECLARATION AND POWER OF ATTORNEY

**DECLARATION AND POWER OF ATTORNEY - PATENT APPLICATION**

As a below named inventor, I hereby declare that my citizenship, postal address and residence are as stated below; that I verily believe I am the original, first and sole inventor (if only one inventor is named below) or a joint inventor (if plural inventors are named below) of the invention entitled:

**PROCESS FOR THE DESULPHURIZATION OF AN ENGINE FUEL ONBOARD A MOTOR  
VEHICLE**

the specification of which

\_\_\_\_\_ is attached hereto, or  
X was filed on October 1, 1999 as Application Serial No. PCT/EP99/07267  
 and was amended on August 3, 2000 (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above. I acknowledge the duty to disclose all information known to be material to patentability as defined in 37 CFR §1.56. I hereby claim foreign priority benefits under Title 35, United States Code §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s) \_\_\_\_\_ Priority Claimed \_\_\_\_\_

<u>198 45 397.3</u>	<u>GERMANY</u>	<u>2 OCTOBER 1998</u>	<u>YES</u>
(Number)	(Country)	(Day/Month/Year)	

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose all information known to be material to patentability as defined in 37 CFR §1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application:

_____	_____	_____
(Application Serial No.)	(Filing Date)	(Status)

I hereby appoint as principal attorneys Herbert I. Cantor, Reg. No. 24,392; James F. McKeown, Reg. No. 25,406; Donald D. Evenson, Reg. No. 26,160; Joseph D. Evans, Reg. No. 26,269; Gary R. Edwards, Reg. No. 31,824; and Jeffrey D. Sanok, Reg. No. 32,169, to prosecute and transact all business in the Patent and Trademark Office connected with this application and any related United States and international applications. Please direct all communications to:

**Evenson, McKeown, Edwards & Lenahan, P.L.L.C.**

**1200 G Street, N.W., Suite 700**

**Washington, D.C. 20005**

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**INVENTOR:**

Eberhard HOLDER

Citizenship:

German

Post Office Address/

Albert-Schweitzer-Strasse 12

Residence:

D-72127 Kusterdingen, GERMANY *DLX*

25.4.2001

(date)

*E. Holder*

(signature of 1st inventor)



**23911**

PATENT TRADEMARK OFFICE

## DECLARATION AND POWER OF ATTORNEY

Attorney Docket No. 225/49816

Page 2

**INVENTOR:**

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4.05.01

(date)

Roland Kemmler

(signature of 2nd inventor)

**INVENTOR:**

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Residence:

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27.04.01

(date)

Martin Matt

(signature of 3rd inventor)

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Residence:

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(date)

Viktor Pfeffer

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17.05.01

(date)

Carsten Plog

(signature of 5th inventor)

**INVENTOR:**

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Residence:

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29.05.01

(date)

Thomas Stengel

(signature of 6th inventor)

**INVENTOR:**

Citizenship:

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04.05.01

(date)

Ralph Stetter

(signature of 7th inventor)

DECLARATION AND POWER OF ATTORNEY

Attorney Docket No. 225/49816

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*8th* INVENTOR:

Citizenship:

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*DEX*

15.05.01

(date)

K.-H. Thiemann

(signature of 8th inventor)

DECLARATION